

Nomination Report

**Australian Historic Engineering Plaquing Program
A Historic Engineering Marker (HEM)
for**

**City of Sydney Streetlighting
Centenary, 8th July 2004.**



Early George Street, Sydney.

Prepared by: Chris Dalitz

Deputy Chairman, Heritage Committee-Sydney Division

APPENDIX A

Nomination Form

Australian Historic Engineering Plaquing

The Administrator
Engineering Heritage Australia
The Institution of Engineers, Australia
Engineering House
11 National Circuit
BARTON ACT 2600

Name of work: **City of Sydney Streetlighting**

The above-mentioned work is nominated to be awarded a:

~~National Engineering Landmark*~~:

▪ Historic Engineering Marker*:

* (Delete as appropriate).

Location, including address and map grid reference if a fixed work:

Central Business District of the City of Sydney

Owner: **EnergyAustralia**

.....

The owner has been advised of this nomination, and a letter of agreement is attached.

Access to site: **A suitable site for the Plaque, in a publicly accessible location in the CBD precinct, is presently being negotiated with EnergyAustralia and The Council of the City of Sydney. A location near the Town Hall/QVB is favoured.**

.....

Nominating Body: **Heritage Committee-Sydney Division**

Glen Rigden

Chair of Nominating Body

Date:

Chair of Division Engineering Heritage
Group

Date:

APPENDIX B

Engineering Heritage Australia

Plaquing Nomination Assessment Form

(An electronic copy of this form should be obtained from the Division engineering heritage group of The Institution, so the format can be expanded to include all the necessary information.

Please complete as many items as possible, but leave blank any for which the information is not available, or would involve considerable research).

1. BASIC DATA

Item Name: City of Sydney Streetlighting

Other/Former Names: Not Applicable

Location (grid reference if possible): Central Business District of the City of Sydney. The original 1904 installation of 343 lamps covered an area from Redfern Railway Station north to Circular Quay, and east to west from Hyde Park to Darling Harbour

Address: City of Sydney

Suburb/Nearest Town: Sydney

State: NSW

Local Govt. Area: Council of the City of Sydney

Owner: EnergyAustralia (formally known as Sydney Electricity, Sydney County Council, and originally the Electricity Undertaking of the Municipal Council of Sydney)

Current Use: The Streetlighting network is a “system” that has constantly being altered, extended and upgraded over the past 100 years. Like many engineering systems, it is therefore not homogeneous in age or design. Probably no elements of the 1904 system remain in service today, although some of the original cables, now abandoned, may lie buried in Sydney’s streets. The City of Sydney Streetlighting network remains in use today, but in a much evolved form to the original installation.

Former Use (if any): Not applicable. A system of Gas lights existed in the City of Sydney, prior to (and for a short time concurrently with) the electric lights, but the Gas lights were generally not considered suitable for conversion to electricity.

Designer (s): Sir William Preece KCB & Major Cardew (1900)

Mr T Rooke, Resident Electrical Engineer (1902)

Mr R Vine-Hall, Assistant Electrical Engineer (1903)

Mr R.H. Brodrick, City Building Surveyor

Maker/Builder(s): Electrical machinery, boilers: Dick Kerr & Co. (London)

Cables: W.T. Henley (London)

Buildings & Conduits: Mr J. Stewart & Co. (Sydney)

Chimney Stack: Mr C Richards (Eskinville)

Structural Steelwork: Scrutton & Co. (Sydney)

Street lamps, pillars etc.: The Clyde Engineering Co.(Sydney)

Substations: Mr Owen Ridge & Son, Mr J.C. O'Brien, Messrs Grant and Craven. (all suburban Sydney)

Year Started: 1902

Year Completed: 1904

Physical Description: (original 1904 system)

The original power station was at Pyrmont (now the site of the Casino) and the original 1904 lighting network consisted of 343 street lamps (231 Direct Current and 112 Alternating Current) supplying an area from Redfern Railway Station north to Circular Quay, and east to west from Hyde Park to Darling Harbour.

The power station comprised five Babcock and Wilcox boilers feeding an engine room with three steam driven generators (enclosed Ferranti type), one of 500 horse power and two of 1000 horse power. The generators were Dick-Kerr three phase units generating at 5,000 Volts AC (nominal).

There were two underground cable networks – one AC and one DC. A total of 27 ½ miles of trenching contained over 100 miles of cable. There were substations at Town Hall, Darlinghurst, Wilson Street, Lang Park and Athlone Place.

The DC substations contained high voltage three phase motors coupled to twin 240 Volt DC generators, providing a three conductor DC system of +240 Volts and -240 Volts with common neutral. Hence, lamps and DC lift motors could be connected across 480 Volts. The DC network could be configured as six separate networks, or connected as one large network by fuse pillars.

The AC substations contained transformers to convert the 5000 Volts to 415 Volts. Both the AC and DC substations had similar high voltage switchgear of the Ferranti cellular type.

The arc lamps were connected in series on each LV underground distributor cable. There were ten lamps on each 480 V DC circuit, and nine lamps on each 415 V AC circuit. The lamps were placed between 50 and 70 yards apart on the major streets, and up to 100 yards apart in side streets. Whilst the gas lamps had previously produced around 40 candle power, the arc lamps produced 2000 candle power.

Physical Condition:

The Streetlighting network is a "system" that has constantly being altered, extended and upgraded over the past 100 years. Like many engineering systems, it is therefore not homogeneous in age or design. Probably no elements of the 1904 system remain in service today, although some of the original cables, now abandoned, may lie buried in Sydney's streets. The City of Sydney Streetlighting network remains in use today, but in a much evolved form to the original installation.

Modifications and Dates: see above

Historical Notes:

At approximately 5:00pm on 8 July 1904, the Lady Mayoress of Sydney, Mrs S.E. Lees, officially 'switched on' the electricity supply to the city. As she turned the key, the Lady Mayoress said :

"I have much pleasure in switching on the electric lighting for the City of Sydney. I trust that it will be a boon to the citizens and an encouragement to the enterprise of the City Council".

The official ceremony was conducted at the new power house on a wet and stormy evening. The Sydney Morning Herald of the following morning reported as follows:

"There was the usual flow of oratory, it being an unwritten law of such ceremonies that retrospection should be indulged in, hopes expressed, and congratulations exchanged. All the speeches were governed by these considerations."

The Sydney Mail of 13 July 1904, in a feature on the project, wrote the following:

"The prices at which the Council is prepared to supply electricity are claimed by the Lord Mayor to compare very favourably with the prices prevalent in any of the great cities of the world, and to be lower than the prices previously current in Sydney, especially for power, which is being offered 33 per cent cheaper than hitherto."

Indeed the initial tariffs, as summarised in "50 Years of Electricity Supply" by Gordon F. Anderson, were most interesting when compared with today's prices:

"The Council gave the customer the choice of two rates for lighting; he could pay a flat rate of 4½d. per unit of electricity used or, on a maximum demand rate, pay 5d. for the primary units used and 2d. for all other units used. The rate for supply for motors, lifts, heating and cooking was 2d. per unit."

The author of this book describes the 'new electric light' as follows:

"Without warning, a brilliant light struck the heart of the city. It seemed as though a flash of lightning had seared its way across the night. But, unlike lightning, it remained - radiant and steady. People ignored the wind and rain, and stopped to stare wide-eyed at the new street lamps. Stranger spoke to stranger of the phenomenon."

This original key used by the Lady Mayoress to switch on the streetlights is in the shape of the original street lamps. The key is now held by the Powerhouse Museum.



The key and switch used by the Lady Mayoress to switch on Sydney's electricity supply at Pyrmont Power Station, 8th July, 1904.

The switching-on ceremony of 8th July 1904 effectively marks the commencement or “birth” of the Electricity Undertaking of the Municipal Council of Sydney, and its successors, the Sydney County Council (1936), Sydney Electricity and now EnergyAustralia.

The original electricity network was intended primarily for streetlighting. At the start of 1905 there were 86 private customers. By the end of 1905, there were 519. Energy supplied in 1905 was approximately 2.6 MWhr.

Today EnergyAustralia is one of Australia’s largest electricity distributors and energy providers, supplying over 1.4 Million customers across the Sydney, Newcastle and Upper Hunter regions. As at 30 June 2003 it supplied 238,238 streetlights across its network. In the year 02-03 EnergyAustralia distributed 25,639 GWhr to its customers.

2. ASSESSMENT OF SIGNIFICANCE

Historic Phase:

The City of Sydney was relatively late in obtaining a reticulated electricity network for streetlighting and general public use.

In America, the California Electric Light Co. commenced a public network in September 1879 in San Francisco. Siemens Bros installed a public lighting network in Godalming, England in 1881.

The town of Tamworth has the distinction of being the first town in the Southern Hemisphere to light its streets by electricity, on 9 November 1888. It was soon followed by Young, Penrith, Moss Vale, Broken Hill and Redfern by 1891.

Private installations and buildings had electricity much earlier. Electric lighting was first used commercially in Sydney by providing electric arc lighting for the after-dark construction of the International Exhibition Garden Palace at the Botanic Gardens in 1878. The Macquarie Lighthouse was powered by electricity in 1883.

In 1891, following some controversy over the “rights” to light Sydney’s Streets between the Municipal Council and the Australian Gas Light Co. a special committee was formed to determine the “best” system for Sydney. The Municipal Council of Sydney Electric Lighting Bill was first introduced to the Legislative Assembly in 1891, but not passed until 1896. It would be a nearly another eight years till the “switching on” of a “mixed” AC and DC system. Some would argue that this is what to expect from a committee.

However, the delays must be considered in the context of the electrical technology of the day. Whilst DC systems had been proven in traction applications, such as Railways and Tramways, the new AC systems had advantages for transmitting energy over greater distances, as voltages could be stepped up and down by transformers. The fact the Sydney network used both in 1904, gave many options. Indeed, the a DC network in Sydney was maintained right up until the 1980’s, supplying a small number of DC motored lifts in Heritage buildings in the CBD.

Historic Individuals or Association:

E.C Cracknell, Superintendent of Telegraphs in Sydney, Special Committee member

Prof. R Threlfall, Professor of Physics, Sydney University, Special Committee member.

Sir William Preece KCB, Consulting Engineers, London and formerly Engineer-in-chief to the Post Office Department at St. Martin’s Le Grand and twice President of the Institution of Engineers (UK). – original designer.

Major Cardew, Board of Trade expert – assistant designer with above.

T Rooke, first Resident Engineer. Born and educated in England, worked for Elwell and Parker and the Electric Construction Corporation of Wolverhampton before coming to Australia to take up this position. Had worked with Preece-Cardew.

Roger Vine-Hall (1878-1967), Junior Assistant Electrical Engineer to the above. Graduate of Sydney Technical College, gained a Peter Nicol Russell Scholarship to

Sydney University in 1899 and completed mechanical and electrical engineering. Worked for Chapman and Co and the Mort's Dock and Engineering Company. Vine-Hall had a long and distinguished career with the electricity undertaking, eventually becoming General Manager of the Sydney County Council in 1939, before retiring in 1944.

Felix Kirk (?-1938) Engineer in Charge of contracts with Henley's (London). Educated in Dusseldorf and London, commenced with Siemens Bros. in Charlton as a cables engineer, then with Kabelwerk Duisburg in Germany. Returned to England to work with Henley's when he came to Sydney in 1903-04 to supervise the Sydney works. ***His telegram to London of 9th July 1904 appears below.*** Returned to a career in England and the Continent before coming back to Australia as a Divisional Engineer with the PMG (nearly ten years) then Managing Director of Australian Insulated Wire Company.

Creative or Technical Achievement:

At the time it was conceived and built, the electricity system for the City of Sydney was not particularly unique or innovative. In fact, "proven" designs and equipment from reputable overseas companies were favoured.

Research Potential:

The history of the various organisations that followed from these humble beginnings can be explored in much greater detail, as can the lives of many of the individuals involved in the pioneering days of the various electricity undertakings. (Sydney County Council, Electricity Commission of NSW, Pacific Power, etc).

Social:

The desire for a reliable electricity network recognised the emerging importance of electricity to a vibrant economy, both as a factor of production (an input to producing other goods and services) and for the lifestyle and comforts electricity provides to the citizens of Sydney (light, heat, power, entertainment etc). *(see image of the Badge of the Sydney County Council included later).*

As the Lady Mayoress of Sydney, Mrs S.E. Lees, said as she turned the key on the 8 July 1904 :-

"I have much pleasure in switching on the electric lighting for the City of Sydney. I trust that it will be a boon to the citizens and an encouragement to the enterprise of the City Council".

Rarity:

There is now only one electricity network – see Statement of Significance below.

Representativeness: Not applicable

Integrity/Intactness: Not Applicable

References:

1. "50 Years of Electricity Supply" Gordon F. Anderson
2. "Sydney – from Settlement to City" Edited by Don Fraser.
3. "100 Years of Lighting the Way" Compiled by Anna Collins for the Electrical Trades Union of NSW.
4. Photocopies from the SMH and Daily Telegraph of 9 July 1904, and the Sydney Mail of 13 July 1904 kindly provided by Don Fraser, sourced from the State Library archives.
5. Notes provided by Robert Kirk, Grandson of Felix Kirk.
6. Engineering Heritage Australia newsletter No 6 of September 1996.

Statement of Significance:

The City of Sydney Streetlighting network can be considered the beginning of a State Wide electricity grid. In 1907 & 1908 the Electricity Undertaking of the Municipal Council of Sydney purchased the private electricity undertakings of the Empire Electric Light Co. Ltd, the Strand Electric Lighting Co. Ltd, the Oxford Street Lighting Co. and the Imperial Arcade Street Lighting Co. Ltd.

So began a series of expansions, take-overs, amalgamations etc through to the formation of the Sydney County Council in 1936 (later Sydney Electricity and EnergyAustralia), and the Electricity Commission of NSW in 1950 (later Pacific Power and TransGrid).

The humble electricity network of 1904 is therefore the "Great Grandfather" of the State Wide electricity grid, and now (by "marriage" with the other Eastern States), today's National Electricity Grid (the longest such AC Grid in the World) and a National Electricity Market (NEM).

Assessed Significance: State

Plaque Wording Proposed :-

The citation for this historic engineering marker reads as follows.....

City of Sydney Streetlighting

On 8 July 1904, Lady Mayoress Mrs S Lees switched on the first electric streetlights in central Sydney with power for the 343 lamps supplied from the new Pyrmont Power Station. The project involved engineers E C Cracknell, Superintendent of Telegraphs, consulting engineers Sir William Preece KCB and Major Cardew of London, Resident Engineer T E Rooke and F Kirk for cable laying contractor, Henley's of London. Streetlighting demonstrated the importance of electricity for the development of a modern society through improved services and its production of goods.

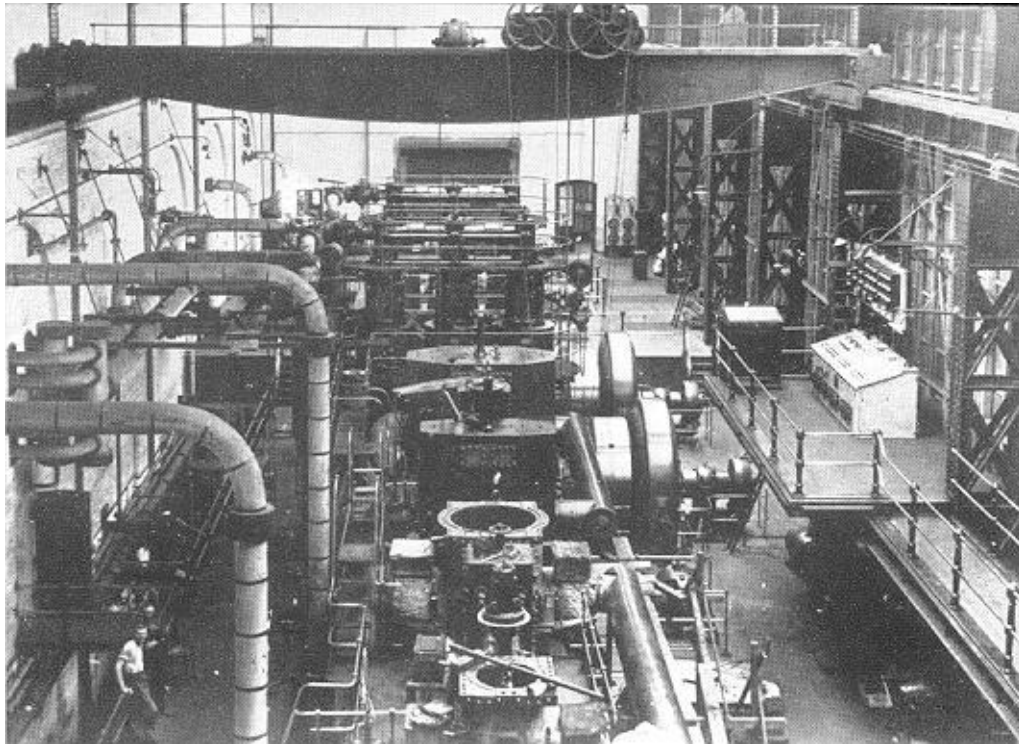
*The Institution of Engineers Australia,
EnergyAustralia and City of Sydney
on the Centenary 2004*

Image/s with caption:

The following images are all taken from the references listed above :-



Pyrmont Power Station – 1904 (Ref.1.)



Pyrmont Power Station – 1904 (Ref.1.)



Laying Cables near Sydney Town Hall in 1903 (Ref. 6)



George Street, Sydney – 1904 (Ref.4)



T E Rooke, the representative of Preece and Cardew, in 1904 became Resident Electrical Engineer of the Sydney City Council.

Roger Vine Hall, 1878-1967, made a significant engineering and management contribution to the generation and distribution of electricity for Sydney from 1904 to 1944. (Nick Vine Hall)



Early Pioneers (Ref.2)

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Felix Kirks telegram back to Henley's in London, July 9 1904 (Ref.5)



The First meeting of the Sydney County Council on 7 January 1936, From L-R, Councillor J.H. Gardiner, Councillor A. McElhone, General Manager Hugh Rose Forbes Mackay, Councillor S.A. Lloyd MLA and Chairman, Mr E.P. Austin (Secretary), Councillor J.O. Cramer and Councillor E.C. O'Dea. (Ref. 1)



THE BADGE OF THE SYDNEY
COUNTY COUNCIL

In this badge the traditional symbol of the sun depicts heat, the classical torch depicts light, and the figure of the horse depicts power.

The English version of the Latin Motto is:
"Let the future excel the past."